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Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XV APRIL 5, 1926 NUMBER 5

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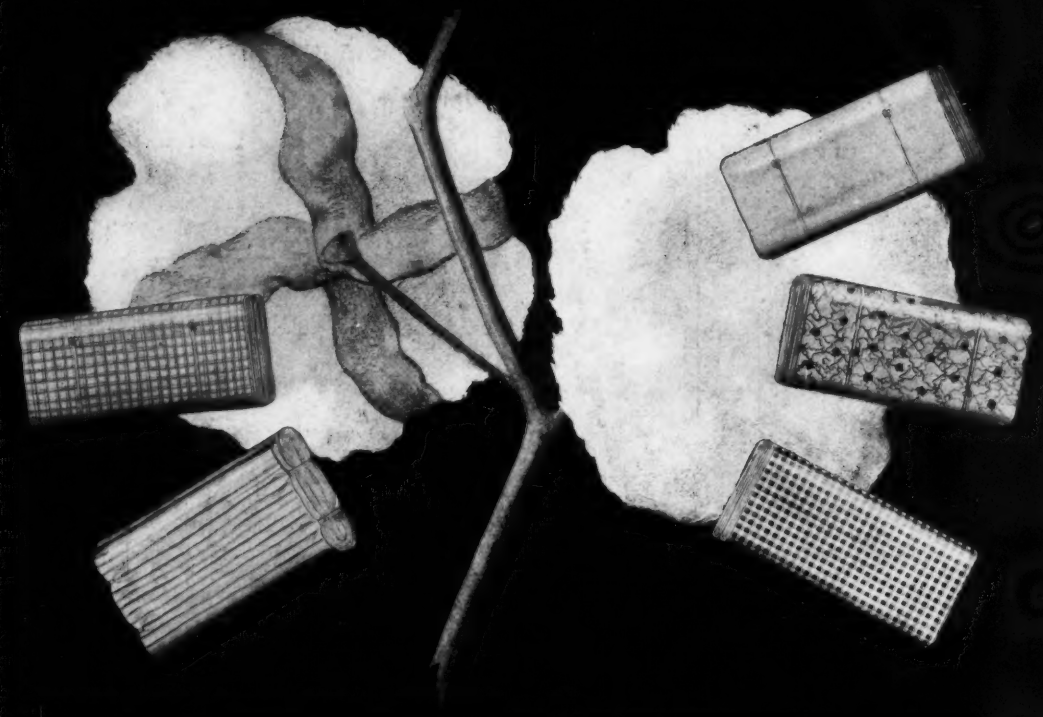

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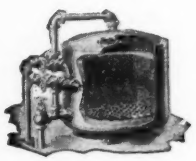

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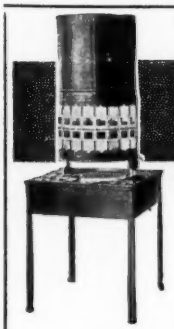

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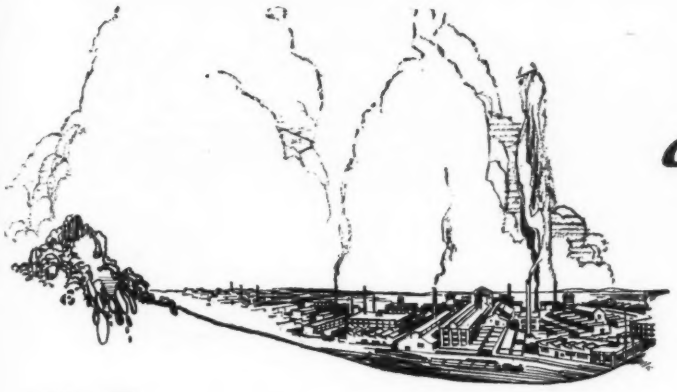

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Contents of This Issue

April 5, 1926

Fading Experiments with the Osram Point-Light Lamp 227
E. Hochheim and E. Knebel

The Dyeing of Bast Fiber and Straw.... 230
Dr. Flemming

Proceedings of the American Association of Textile Chemists and Colorists

Thirty-Seventh Council Meeting..... 231

Thirty-Third Research Committee Meeting 232

March Meeting of the Philadelphia Section 233

Spring Meeting of the Southern Section.. 233

Errata 233

Applicants for Membership..... 233

Changes of Address..... 234

Editorial:

Still Outside the Ranks of the Progressive 235

Knitting Arts Exhibition Includes Many New Merchanical Features 236

Dyers and Cleaners to Have Research Institute 237

The Reduction Products of Azo Dyes—Part X 240

Technical Notes from Foreign Sources... 243

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VOLUME XV NEW YORK, APRIL 5, 1926 NUMBER 5

Fading Experiments With the Osram Point-Light Lamp

Disadvantages of Various Types of Fading Lamps—Construction of Osram Lamp—Tests Showing Its Close Correspondence to Sun—Possibilities as Standard

By E. HOCHHEIM and E. KNEBEL, Ludwigshafen

(Translated from Melliand's Textilberichte by Carl Toepler)

DURING the winter months the natural source of light in our latitude is mostly so unsatisfactory that the need of a better source of light which gives results of fading tests in a short time is very great. For this reason, for some time past artificial sources of light have been resorted to for fading tests, principally the mercury-arc lamp, which is rich in ultra-violet rays. More exact investigations—for example, those of H. Walther,[1] A. Scheurer,[2] K. Gebhardt [3] and others—have shown, however, that the mercury vapor lamp often has an effect upon the dyeings in a manner wholly different from and often directly opposite to that of sunlight or diffused daylight. Recently, since mercury vapor lamps have been recommended again for fading tests in the examination of dyes, P. Heermann and H. Sommer [4] have carried on further rigorous investigations through which the earlier experimental results mentioned have been wholly confirmed.

Oftentimes carbon arc lamps have been used as a source of light for this purpose, but likewise in many cases, according to the kind of carbon used, they show more or less serious deviations from the results of daylight or sunlight exposures, and therefore afford no accurate results.

The Osram Lamp

In the search for a better artificial source of light, we have carried on experiments with a new tungsten arc lamp of the Osram-Gesellschaft, Berlin, called the Osram Point-Light Lamp (Osram-Punklichtlampe).

It consists of an incandescent bulb filled with an inert gas and hermetically sealed, containing two hemispherical electrodes consisting essentially of tungsten, in contact with each other, which are heated by an arc produced between them and brought to the point of radiation.

The starting of the lamp takes place by a compound metal strip, inserted in the flexible cathode, becoming heated by the passage of the current and raising the cathode away from the anode, whereby an arc is produced.[5] The lamp costs at present fourteen marks, is the approximate size of a common 100-c.p. incandescent light and has a life of about 400 to 500 hours. It can be used only with an interposed resistance—a resistance of 15 ohms at 110 volts and of 34 ohms at 220 volts for a current of 5 amperes.

The Osram lamp differs from other artificial sources of illumination used up to the present by the fact that the composition of its spectrum approximates that of sunlight very closely. It satisfies, therefore, in a high degree the first requirement that must be imposed on any source of light which is to furnish an illumination of the same spectral composition as that of the sun.

A comparison of the three spectrograms here given—those of sunlight (I), of the Osram lamp (II) and the quartz mercury vapor lamp (III)—shows plainly that the sun and the Osram lamp produce two very similar continuous spectra, (I) and (II), which are both terminated at about 300 uu, while the spectrum of the quartz mercury vapor lamp consists only of separated lines, among which those rays whose lines lie between 200 and 300 uu exert a strongly decomposing effect and are not present in sunlight at all.

Now, since in many dyestuff tables the action of merely the ultra-violet rays is of great importance, such a difference in the light source must naturally bring about serious deviations in the results of the fading tests.

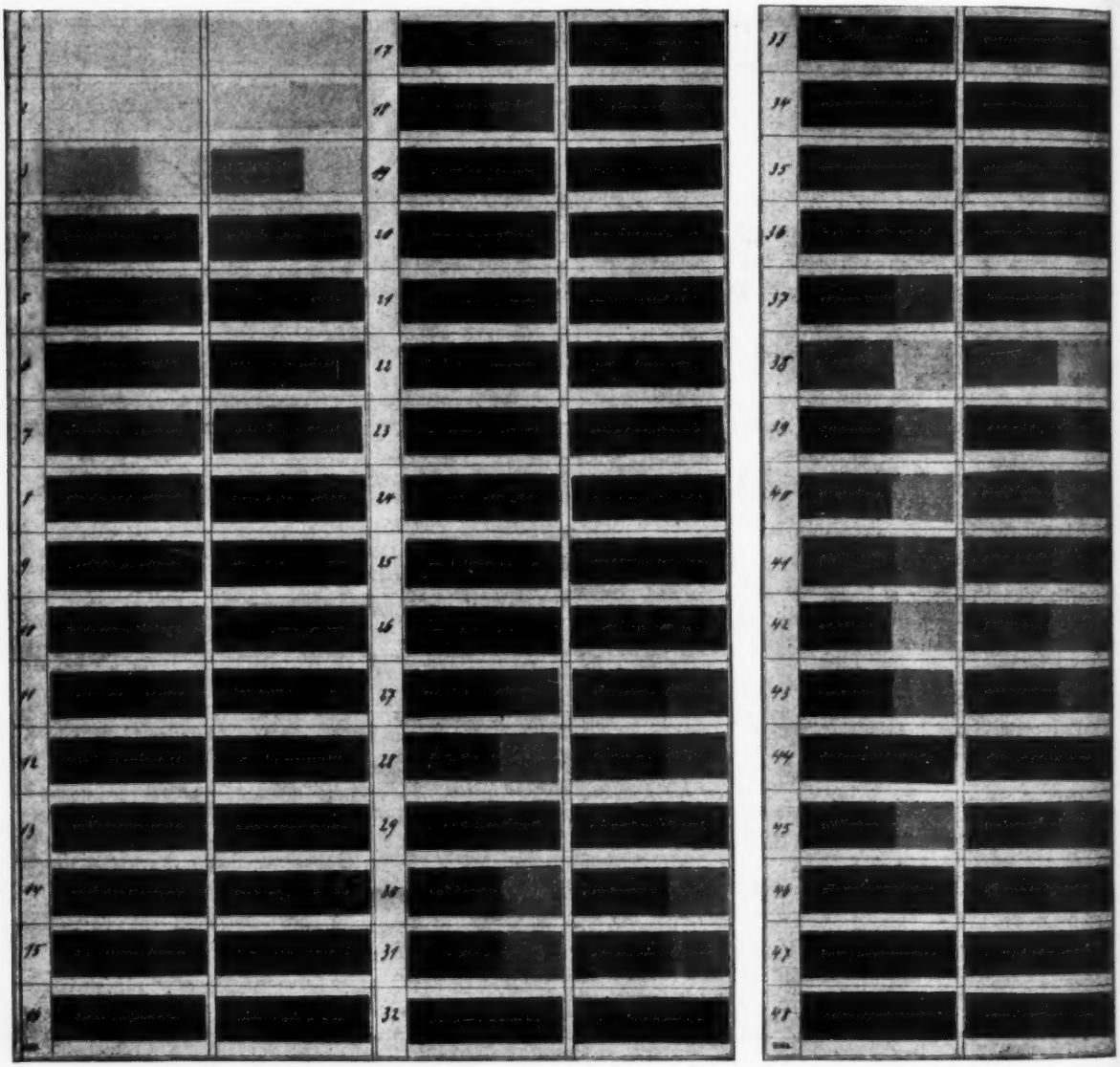
Carbon arc lamps more closely approximate the sun through their continuous spectrum, but likewise differ essentially from the solar spectrum through their content in rays below 300 uu, so that here also the frequent de-

viations noticed in the results of fading tests are very easily explained.[6]

Fading Tests with Osram Lamp

In the fading tests undertaken up to the present with the Osram lamp there has been evident a very good correspondence with sun or daylight illuminations, due to the correspondence of its spectrum with the solar spectrum, above all in the case of lakes or dyeings of poor fastness to light. Thus, co-operative fading tests of forty-eight lakes of a shade card show a very good correspondence in fading as well as in alteration of shade, in spite of abnormal conditions in the atmosphere surrounding the light sources (see fading tables). The dyeings or lakes in these experiments were simply set in a circle about the lamp at a distance of 15 cm. from the midpoint of the lamp. With this arrangement, an average temperature of 50 to 55 deg. Cent. and a relative humidity of 15 to 18 per cent prevailed, while in the tests conducted in September, 1924, the average temperature was about 15 to 20 degrees lower and the relative humiidty at least 30 to 40 per cent.

In the case of lakes which demand a longer exposure to light, there is also evident, in general, a good practical



Exposed to light 12 days (Sept. 6-17, 1924), nine of which were decidedly sunny days. *Exposed 178 hours to the Osram lamp.* *Daylight.* *Lamplight.* *Daylight.* *Lamplight.*

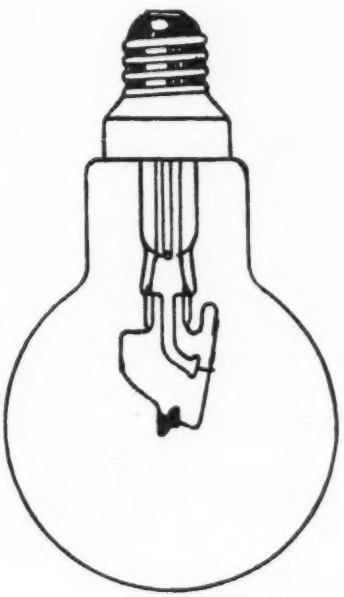
correspondence; only certain dyes show slight deviations, which perhaps could be obviated in part by alteration of the atmospheric conditions about the lakes or dyeings (increase of humidity, lowering of the temperature, interposing of suitable light filters, etc.). Principally, however, they are certainly to be ascribed to the still present differences in the light sources. The maximum energy of radiation of the Osram lamp lies actually in the ultra-red region, while that of the solar radiation lies in the blue. Furthermore, in addition, the ultra-violet radiation of the lamp, in spite of strengthening and extension through the nitrogen bands, does not attain the intensity of the solar spectrum in this region. (See spectrograms I and II.)

Spectrograms I, II and III

In spite of all this, the new tungsten arc lamp (especially if one weakens the red part of its spectrum through a water filter of a few centimeters thickness), as the experiments up to the present indicated, gives for a large number of dye lakes and dyeings not only almost the same degree of fading as the sun but, in almost all cases, in addition, an extensive correspondence in the alteration of the shade.

Since the tungsten arc lamp is, in addition, free from atmospheric disturbances, and can be kept constant in its radiation for a long time by regulation of the amperage and voltage, it also makes possible quantitative measurements (for example, the measurement of the total energy necessary for fading), especially when the spectrum of its radiant energy with and without water filters has been exactly measured.

If it should be possible to approximate the spectrum of the Osram lamp more closely to the solar spectrum, we should not consider it impossible, ultimately, for one to be able to establish the Osram lamp as a standard lamp of which the illumination should furnish a constant average of several exposures to sunlight or daylight accomplished at different times. Thereby it could then come into consideration as a standard for the determination of the light fastness of dyes.



Nitrogen-Filled Osram Point-Light Lamp for Direct Current; operates by the separation of the electrodes.

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[2] Bull. de Mulhouse, 1910, p. 324; Rev. mat. col., 1911, p. 146.

[3] Zeitschrift fuer angewandte Chemie, 1911, p. 1807; Chemiker-Zeitung, 1913, p. 612.

[4] Chemiker-Zeitung, 1924, p. 813; Leipziger Monatsschrift fuer Textil-Industrie, 1925, p. 95.

[5] From "Die Umschau," Wochenschrift ueber Fortschritte in Wissenschaft und Technik, Frankfurt a. M., Heft 7.

[6] In the journal "Papierfabrikant," 1925, part 8, p. 115, reference is made to an article by H. S. Theves, on the Light Fastness of Dyestuffs (Pulp and Paper Magazine, 22, 1921), in which it is stated that the best source of light for dyestuff testing is a white arc light obtained from certain impregnated carbons, and having the same spectrum as sunlight.

The Dyeing of Bast Fiber and Straw

The Two Classes of Straw—Wetting Down—Bleaching—The Dyes Employed—The Dyeing Process

By DR. FLEMMING

(*Deutsche Faerber Zeitung, volume* 60, *pages* 541-2)

Translated by Ismar Ginsberg, B. Sc., Chem. Eng.

INTIMATE technical knowledge and attention to details are necessary in order to be successful in the dyeing of bast fibers and of straw. The straw that arrives at the dyeing establishment ready for the coloring process is either in the loose condition or in the form of loose plaits or plaited ware or else in the shape of hats and the like. The dyer must take this material and color it satisfactorily. It is evident that one and the same process, at least from a mechanical standpoint, cannot be employed for all these materials.

In the dyeing of loose straw care must be taken to see that the fibers are neither broken up nor split, for if this were to happen they would naturally be entirely unsuited for further use. Hence, in order to protect the fibers from being broken up it is customary to carry out the dyeing operations in a four-sided vat. However, in the case of finished straw goods, that is, straw in the condition or form in which it will eventually be used, it is not necessary to take so much care in the dyeing process.

The duration of the coloring process will depend largely on the character and properties of the materials that are being dyed. Straws are of different kinds and are generally separated into two classes: The first of these contains the straws which are softer than the others, such as the wheat, oat and barley straws. The second class includes the harder straws, such as rye straw. The straws behave quite differently in the color bath in accordance with their origin. Soft straw has the capacity of absorbing the coloring matter a great deal more readily than the hard straw, and the result is that such straws are colored very rapidly and much more uniformly than the hard straws. For this reason the latter straws must be dyed with a great deal more care and at a much slower rate in order to avoid all irregularities of color in the finished material.

For dyeing the straw fibers the basic coloring matters, as well as the acid and substantive colors, may be used with good results. The basic coloring matters may be used directly on the straw fiber and without the necessity of subjecting the latter to a preliminary mordanting treatment. In producing dark shades on the straw fiber it is satisfactory to dye the fiber as it is colored in the natural state, but in order to obtain good results in dyeing light and delicate shades on straw it is necessary that the raw straw first be bleached.

Before the straw is put through the process, and this makes no difference if this process is bleaching or dyeing itself, it is necessary to see that the raw product is well wetted down. This preliminary treatment is sufficient when the straw is to be dyed in dark shades, but when light colors are used in the dyeing process it is essential to put the raw straw through a cleansing process as well in order to remove any impurities which might be contained in it and which might give the dyed product a spotty or streaky appearance.

Wetting Down

The wetting of the straw is accomplished by placing it in boiling hot water and allowing it to remain in the vat under water for a period of twelve hours. It is best to enter the straw into the water in the evening and take it out of the vat the next morning. The softening action of water on the crude straw is materially enhanced when a little sodium carbonate and tetrapol are added to the solution. During the course of this process it is essential to see that the crude straw is always kept under water. This is most effectively accomplished by placing the straw in the tank and then covering it with a latticework or screen which may be made from wood or from copper wire. In special cases, and this applies particularly when the material is to be dyed quickly, so that a long duration of the softening process may necessitate too long a stay of the straw in the plant, it is customary to subject the straw to a digestion or rather cooking process which lasts approximately two hours. In this case the liquor employed is mixed with sodium acetate, so that the reconcentration of the solution is about one-half a per cent of sodium acetate, based on the weight of the straw that is being treated. This method of preliminary treatment of the straw is applicable only to such straws that are to be subsequently dyed in dark shades. It should under no circumstances be employed for straws that are to be colored in light shades, for the treatment, as explained above, gives the straw a dark yellowish color which can have quite a bad effect on light, delicate shades.

After the straw has been put through the aforementioned cleansing and wetting the fibers are then bleached in order to remove the natural coloring matters that are contained in them. All the general processes which are ordinarily employed in the bleaching of animal fibers have

(*Continued on page* 238)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Southern Section—
Leonard S. Little, Chairman, Pacific Mills, Lyman, S. C.
Harry W. Ormand, Secretary, Union Bleachery, Greenville, S. C.

THIRTY-SEVENTH COUNCIL MEETING

The thirty-seventh meeting of the Council of the American Association of Textile Chemists and Colorists was held in the Engineers' Club, Boston, Mass., on Friday, March 5, 1926.

The following members were in attendance: L. A. Olney, W. D. Livermore, W. C. Durfee, W. H. Scott, G. A. Moran, J. F. Bannan, W. R. Moorhouse, R. F. Culver, W. S. Williams and W. E. Hadley.

The following applicants were elected to membership:

Active Members

Bell, John E., textile chemist, U. S. Testing Company, New York, N. Y. 168 Van Houten Avenue, Passaic, N. J.

Crabtree, L. L., chemist and textile engineer, The Salt's Textile Manufacturing Company, Kossuth Street, Bridgeport, Conn.

Dainton, William A., salesman, John Campbell & Co., 107 Broadway, Providence, R. I.

Hayes, Clifford B., overseer, Pacific Mills, Lyman, S. C.

Helliwell, H. J., demonstrating salesman, Geigy Company, Philadelphia, Pa. 1241 West Westmoreland Street, Philadelphia, Pa.

Howard, Stephen F., Jr., general bleachery hand, Rear 50 Kinsman Street, Lowell, Mass.

Lincoln, Warren F., salesman and demonstrator, Chemical Company of America. 844 Beacon Street, Boston, Mass.

Murphy, Robert E., demonstrator-salesman, Dunker & Perkins Company, 263 Summer Street, Boston, Mass. 178 D Street, Lowell, Mass.

Sackett, George A., textile chemist and chemical engineer, Mount Hope Finishing Company, North Dighton, Mass. Box 56, North Dighton, Mass.

Scott, Lester C., managing engineer, National Duo-Dye Company, 5 Colt Street, Paterson, N. J.

Souther, Roy Hobart, colorist and chemist, Proximity Print Works, Denim Branch, Greensboro, N. C.

Swope, George E., chemist, Ellis Jackson & Co., Philadelphia, Pa. 18 North Front Street, Philadelphia, Pa.

Washburn, G. R., dyer, Geigy Company, Philadelphia, Pa. 35 South Annapolis Avenue, Atlantic City, N. J.

Junior Members

Andreoli, Richard J., color weigher, Merrimack Manufacturing Company, Lowell, Mass. 155 Gorham Street, Lowell, Mass.

Grier, William H., finishing department, Pacific Mills, Lyman, S. C. Box 52, Lyman, S. C.

Hillman, Bernard S., chemist, Sidney Blumenthal Company, Shelton, Conn. 91 Caroline Street, Derby, Conn.

Laurin, Sven Albert, assistant dyer, Slatersville Finishing Company. Slatersville Inn, Slatersville, R. I.

Lindsly, Walter C., student, Lowell Textile School, Lowell, Mass. 49 Nesmith Street, Lowell, Mass.

McArdle, J. J., instructor, Bradford Durfee Textile School, Fall River, Mass. 36 School Street, Fall River, Mass.

McKinnes, Frank, technical assistant to management, Royal Piece Dye Woorks, Inc., Paterson, N. J. 1031 East Nineteenth Street, Paterson, N. J.

Metz, William G., dyestuff salesman and demonstrator, General Dyestuff Corporation, 230 Fifth Avenue, New York, N. Y.

Robinson, Marjorie L., student, Lowell Textile School, Lowell, Mass. 108 Powder House Boulevard, West Somerville, 44 Mass.

Roscow, J. R., assistant in charge of printing plant, National Silk Dyeing Company, Dundee Lake, N. J. 334 East Thirty-sixth Street, Paterson, N. J.

Shanklin, W. M., bleacher, Pacific Mills. Lyman, S. C.

Stewart, W. A., salesman and demonstrator, Providence Drysalters Company, Providence, R. I. 110 East Fourteenth Street, Atlanta, Ga.

For some time past the Council has been using extreme care in considering the qualifications of applicants for membership in the Association, with the object of adhering quite strictly to a literal interpretation of the Constitution. With this in mind, the Council voted to adopt the following interpretation as related to Section III of the Constitution, regarding eligibility of salesmen and demonstrators who from time to time make application for membership in the Association:

INTERPRETATION OF SECTION III

The Council will hereafter interpret the first paragraph of Section III of the Constitution as requiring strictly that persons at the time of their election as active members must be engaged in or directing work relating to the application of dyestuffs and that occasional and incidental "demonstrating" of colors or other materials on the part of salesmen is not sufficient to cover this requirement. A chemical education equivalent to a full chemical course at a textile school of high standing, or at a standard technical college, or five years or more active participation in chemical laboratory or dyehouse, finishing or bleaching work, will be regarded as evidence that an applicant engaged in selling goods and demonstrating is a bona fide textile chemist or colorist, but definite assurance will be required that the applicant is actively using or depending upon the knowledge and experience so acquired.

In connection with the above interpretation, the Secretary was instructed to obtain more information from several applicants relative to their work in relation to demonstrating.

Considerable discussion took place relative to the Annual Meeting, which will be held in the South during the early part of next December, tentative plans for which are already under consideration, both by the Council and the Southern Local Section.

In view of the fact that numerous requests are received from time to time as to the personnel of the Association, its object and work, it was suggested that the President compile data relative to the Association, which would be published in pamphlet form, and this will be submitted to the Council for action at the next meeting.

Within a short time it is the intention of the Council to have the Secretary send to each member of the Council to have the Secretary send to each member of the Association the Annual Questionnaire. This always precedes the publication of the Year Book, and it is earnestly hoped that each member will fill in these questionnaires with as *complete* data as possible.

It was decided to hold the next Council meeting of the Association on Friday, April 16, 1926, in Boston, Mass., at which time many of the members will undoubtedly be attending the Textile Exposition, which will be held in Boston during the week of April 12 to 17.

W. E. HADLEY, *Secretary.*

THIRTY-THIRD RESEARCH COMMITTEE MEETING

The thirty-third meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held on March 5, 1926, at the Engineers' Club, Boston, Mass.

The following members were in attendance: L. A. Olney, W. D. Livermore, W. C. Durfee, W. M. Scott, A. E. Hirst, G. A. Moran, J. F. Bannan, W. R. Moorhouse, R. F Culver, W. S. Williams, W. D. Appel, W. H. Cady, R. W. Hook, H. Christison and W. E. Hadley.

Samples of dyed bunting, which the Government contemplates using for flags and pennants, had been furnished to Professor Olney, and these were examined by the members of the Research Committee, who commented upon them. The President will communicate by letter with the Teechnical Committee on colors regarding the consensus of the Research Committee.

W. D. Appel, of Bureau of Standards, gave a brief report on a recent committee meeting which was held by the Converters' Association in New York City, in which the proper labeling of fabrics as to fastness was considered. It was decided to appoint Prof. L. A. Olney and W. D. Appel to serve as a sub-committee to prepare data for discussion at the next meeting of the general committee.

A consideration of the data which will appear in the 1926 issue of the Year Book was discussed, and W. M. Scott and G. A. Moran were designated to prepare a resume of what should appear as fastness tests for rayon.

Mr. Appel reports that the sets of dyed samples which he has prepared have now been sent to different laboratories, in order that the tentative fastness methods appearing in the 1925 Year Book may be thoroughly tested under

different laboratory conditions; several of these have already reported to him regarding the tests which they conducted, and it is believed that the criticisms and suggestions received from these several laboratories will be instrumental in establishing a set of fastness tests which will eventually be accepted as standard throughout the textile industry.

W. E. HADLEY, *Secretary.*

MARCH MEETING OF THE PHILADELPHIA SECTION

The regular March meeting of the Philadelphia Section of the American Association of Textile Chemists and Colorists was held in Philadelphia on Friday evening, March 19.

The meeting was preceded as usual by the regular informal dinner at the City Club of Philadelphia at 6.30 P. M., fourteen members being present.

At 8.30 P. M. Chairman Carl E. Medde called the meeting to order in the Student Clubroom of the Philadelphia Textile School. The minutes of the previous meeting were read and approved as read.

E. C. Bertolet suggested that in view of the numerous conflicts with meetings of other scientific societies, the section change its meeting night. On motion made by Mr. Kohler, duly seconded and passed, it was voted that meetings be held hereafter on the fourth Friday of each month.

There being no reports from officers of committees or any further business, Mr. Meede introduced the speaker, H. G. Smolens of the Schuykill Chemical Company, of Philadelphia, who addressed the meeting on the subject of "Hydrogen Peroxide in Relation to Its Use in the Textile Industry."

The reading of this paper was followed by a rather lively discussion, after which on motion the Section expressed its thanks to the speaker of the evening and adjourned at 10.15 P. M. The paper will appear in an early issue of the Proceedings.

There were about thirty present.

P. THEEL, *Secretary.*

SPRING MEETING OF THE SOUTHERN SECTION

The Southern Section of the American Association of Textile Chemists and Colorists will hold its spring meeting at the Hotel Patten, Chattanooga, Tenn., on Saturday evening, April 17.

L. L. Bamberger, superintendent of the Cedartown (Georgia) Branch of the United Finishing Company, will discuss "The Dyeing and Finishing of Cotton Piece Goods," and plans to supplement his discussion with a three-reel motion picture illustrating his subject. Due to Mr. Bamberger's training and experience he will be heard with special interest.

J. S. Murray, resident manager of the Central Franklin Process Company, of Chattanooga, will discuss "The Relation of the Franklin Process to the Hosiery Industry." In view of the extensive use of fancy dyed yarns by the hosiery mills for the production of multi-colored effects, Mr. Murray's discussion will be of great importance to the hosiery manufacturers of the South.

A general discussion of timely topics will follow the papers presented by Messrs. Bamberger and Murray.

Errata

Through an unfortunate typographical error part of a sentence was omitted in the fifth paragraph on page 198 of the March 22 issue of The REPORTER in the paper on "Dyeing Acetate Silk," by Harry R. Davies. This sentence as published read: "Both varieties of acetate silk possess the same general properties in the following respects: They are both excellent dielectrics, both are regenerated celluloses." The correct sentence as it appeared in the original manuscript was: "Both varieties of acetate silk possess the same general properties in the following respects: They are both excellent dielectrics, both are difficult to wet out and both absorb moisture much less readily than the regenerated celluloses."

The error was entirely due to the dropping of a line in setting the type and we desire to express our sincere apologies for turning Mr. Davies' statement into one that was obviously wrong.

The chemical formula that appeared on page 205 of the March 22 issue of The REPORTER under the subhead, "Sodium Perborate," in the paper on "Bleaching with Peroxides," by Thomas D. Ainslie, was a line inserted through an error and should not have appeared in the article

Applicants for Membership

Active Membership

Buettner, K. E., National Dyeing Company, Dallas, Tex. Sponsors: P. F. O'Neill and J. B. Smith.

Dort, Robert G., dyestuff sales, service and demonstration, American Cellulose & Chemical Company, New York, N. Y. Sponsors: H. Grandage and R. Haworth.

Harrall, Edwin T., textile superintendent, H. E. Verran Company, Stamford, Conn. Sponsors: Louis Palizza and Ralph F. Culver.

Jackson, Wycliffe C., bleacher, Lowell Bleachery South No. 2, Griffin, Ga. Sponsors: L. L. Bamberger and P. A. Merriam.

Kimble, F. M., Cherokee Spinning Company, Knoxville, Tenn. Sponsors: B. R. Dabbs and P. F. O'Neill.

Murray, John D., resident manager, Central Franklin Process Company, Chattanooga, Tenn. Sponsors: B. R. Dabbs and P. F. O'Neill.

Rizzini, William C., laboratory assistant, H. E. Verran Company, Stamford, Conn. Sponsors: Louis Palizza and Ralph F. Culver.

Roome, Lawrence C., colorist, Princess Print Plants, Inc., Paterson, N. J. Sponsors: Stewart F. Carter and Dr. Alfred Pfister.

Wilhelm, Frederick L., assistant dyer, H. E. Verran Company, Stamford, Conn. Sponsors: Louis Palizza and Ralph F. Culver.

Stanfield, O. B., Peerless Woolen Mills, Rossville, Ga. Sponsors: B. R. Dabbs and P. F. O'Neill.

Changes of Address

Floxham, Harold C., 88 Linwood Avenue, Pawtucket, R. I.

Moffatt, Miles R., 480 Siwanoy Place, Pelham Manor, N. Y.

Schroeder, H., Central Franklin Process Company, Chattanooga, Tenn.

Taylor, Oscar C., Chadwick, N. Y.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

WALTER E. HADLEY,
5 Mountain Avenue,
Maplewood, N. J.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

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STILL OUTSIDE THE RANKS OF THE PROGRESSIVE

IN industry, as in nature, only the progressive survive. The survival of the fittest means, fundamentally, the survival of the progressive. Industrial research has become one of the most distinguishing marks of progress in industry, until to-day, with industrial factors engaged in vicious competition on a world-wide scale, it has become an axiom that the industry which is neglecting research is facing inevitable decay.

By carrying through to practical completion its plans for a research laboratory and training school at Washington, the National Association of Dyers and Cleaners places itself among the ranks of the progressive, along with a number of other somewhat allied groups in this country and abroad who have subsidized collective research for the solution of problems common to their respective industries. The Laundryowners' National Association has been performing very constructive work in its research division at the Mellon Institute of Industrial Research. The Silk Association of American recently laid plans for extensive technical research on silk problems, after accumulating a fund of considerable size for the purpose. The Tanners' Council has a research laboratory at the University of Cincinnati where science is working for the leather industry. In the laboratories of the United States Bureau of Standards in Washington, one of the greatest research centers in the world, thirty-six national organizations are represented by associates engaged in industrial research. In Great Britain the famous Textile Institute and the Cotton Research Institute are aiding the British textile industry to compete successfully with the rest of the world.

In this country the textile industry talks of research. Here and there a corporation sets up its own private laboratory and works patiently on a few individual problems. One or two associations have been formed for the purpose of developing along specific lines certain very important phases of textile processing. Much of great value has already been accomplished, the groundwork laid, the possibilities realized, future operations ambitiously charted.

But how futile all this can be if it awakens little or no response from the industry. How can adequate research facilities ever be secured if the industry itself is not stirred into sufficient enthusiasm to co-operate in this work. The laundry owners, the dyers and cleaners, the tanners, have achieved their fine research laboratories only by intense, wholehearted co-operation, directed toward one central purpose, and by drawing upon the resources of the entire industry to transform their ideal into a reality. In the textile industry, contrarily, any discussion of research usually breaks itself upon the diverse purposes of a number of opposed factions. Instead of intelligently co-ordinating the groups that are now working on textile research problems, these factions make a few scattered, inefficient attempts to awaken interest in various "textile research institutes," each presumably to embrace the work of the entire industry.

True, the textile industry is highly complex and might possibly support a number of different research bodies working upon unrelated problems. But in the one field that is certainly most in need of intensive research the ground has already been broken by the American Association of Textile Chemists and Colorists, which has for the past four years concentrated its efforts upon the establishment of fastness standards for dyes and upon similar problems relating to textile chemistry. In this it has had the valuable co-operation of the Bureau of Standards and has actually completed much of the necessary detail work involved in such a study. It has in turn co-operated with a number of outside agencies in determining fastness tests, and its future research plans will carry it still further in this direction. Any other group which enters upon a similar program could only duplicate the work that has been accomplished; and yet it is the ironical side of the situation that the industry seems more inclined to propose additional research facilities under separate control than to support those already in operation.

The American textile industry cannot be called progressive until it has definitely recognized the need for industrial research. But this need has been recognized, some will cry; yet the mere recognition by a few progressive elements has failed so far to bring about a concerted move to build a comprehensive and properly financed textile research organization on the foundation already laid by the American Association of Textile Chemists and Colorists. Until some move of this nature has manifested itself within the industry we cannot wax enthusiastic over its future progress in competition with the textile industries of the world.

A. P. H.

KNITTING ARTS EXHIBITION INCLUDES MANY NEW MECHANICAL FEATURES

At the Twenty-second Annual Knitting Arts Exhibition, held in the Commercial Museum, Philadelphia, during the week of March 22, under the auspices of the National Association of Hosiery and Underwear Manufacturers, general interest centered upon a number of new developments in mill equipment that were displayed in actual use or operation. Of the more than two hundred exhibits comprising this year's show, the majority, as in the past, were displays of knitting and processing machinery and equipment, and a large percentage of the remainder consisted of very colorful exhibits of skeins, yarns and a variety of finished goods.

This year many of the machinery manufacturers were featuring, in addition to their standard equipment, new devices, attachments and machines never before shown, developments in most cases designed to save labor, time and materials and improve the process. It was commented upon by several of the exhibitors as an encouraging sign that visitors and representatives of the trade attending the show manifested much more than casual interest in these new mechanical developments, and on the closing day a cursory check-up of orders received during the show indicated that while the volume of actual buying may have been slightly below normal, the total was none the less satisfying, particularly when the view is taken that the exhibition is not primarily a form of sales effort.

As usual, the exhibits of moving machinery attracted the greatest attention from technical men, members of the trade and the general public alike. A bewildering variety of Jacquards, hosiery, underwear and sweater machines, winding machines, drying equipment and dyeing, calendering and finishing machinery, all in full operation, virtually turned the Commercial Museum into a huge knitting mill. Add to this countless smaller mechanical devices, general mill equipment, and processing oils, chemicals and dyes shown in conjunction with attractive displays of finished garments, and some impression, more or less indistinct, may be obtained of this year's Knitting Arts Exhibition.

The part it actually played, however, in once more bringing together members of the trades represented, and what its educational value was to those who attended with the sincere intention of deriving benefits from their visit, can only be conjectured, but it is safe to say any general estimate of its true value to the industry as a whole would fix it definitely as one of the most important textile shows of the year.

Below are brief descriptions of a few of the displays more particularly interesting to the dyeing and finishing divisions of the trade:

At the Oakley Chemical Company exhibit in booth No. 274, samples of many kinds of textile fabrics and materials kier-boiled, soaped out, scoured or cleaned with the aid of Oakite were shown. Special prominence was given to samples of cotton hosiery and underwear tubing boiled with the aid of Oakite. Attention was also called to the softness and whiteness of the samples, due to the use of Oakite in the cleaning processes. A staff of Oakite chemists were in attendance to explain the use of Oakite materials.

Jacques Wolf & Co., of Passaic, N. J., occupied booths Nos. 291 and 292, where they exhibited samples of their chemical specialties, including Monopole oil, hydrosulphites, boil-off oil, soluble oil, textile gums for printing, cream softener JB, artificial silk softener, rayon oil, bensopol, Monopole soap, etc. This year much attention was devoted to artificial silk treated with their products. Of considerable interest to knitters was the display of artificial silk from the skein to the finished article, showing the application of Wolf products in processing. Their Philadelphia representative, F. G. Henckel, was in charge of the booths. Dr. Alfred Pfister, president of the company, spent a few days at the exhibit, as well as A. J. Royce and R. S. Griffith

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A complete line of hosiery colors was displayed at the large space occupied by E. I. du Pont de Nemours & Co. There were attractive samples of hosiery dyed with union colors and with dyes that leave either the silk or the cotton white. A feature of special note at this hosiery color exhibit was hosiery dyed with the two new Du Pont blacks, Sulphogene Carbon BS Extra and Pontamine Black HS. The Pontamine Black HS fills the gap between developed and sulphur blacks for hosiery, being manufactured particularly for mixed cotton and silk material, on which it is said to give a perfect union.

In glass cases near the center display of hosiery colors were shown mode shades on leather with hosiery to match; skeins of Du Pont rayon dyed with the fast Ponsol, Pontamine, Diazo and Sulphanthrene colors; hosiery of mixtures of wool and Du Pont rayon dyed with Du Pont colors, and dyed novelty hose of Du Pont rayon.

In attendance at the Du Pont booth were R. A. Carter, Clarence C. W. Wilson, manager of the Philadelphia office; J. D. Sandwick, Greensboro representative; W. J. Hamlin, technical demonstrator of Philadelphia; Carl G. Crug, Reading representative; J. K. Burwell, W. C. Beattie and Charles Hamil.

An entire row of glass cases at one side of the display of E. I. du Pont de Nemours & Co. was devoted to an exhibit of skeins, tram and knit goods dyed with Du Pont colors by the National Silk Dyeing Company, of Paterson, N. J. In these cases were arrayed hosiery tram dyed in a variety of beautiful shades, skeins of rayon, ladies' hosiery dyed with resist colors, plain silk and knitted neckwear and scarfs in a wide range of fashionable designs, all-rayon tricolette and pure dye tricot, weighted Milanese in delicate blues and pinks, and a number of samples of hosiery and piece goods. Du Pont dyestuffs for silk, rayon and union goods were used in dyeing the fabrics and garments displayed in this exhibit, and the dyeings represented the best work of an organization nationally known as master dyers. The exhibit was in charge of N. J. Sprout.

The National Aniline & Chemical Company, Inc., was represented in spaces 57, 58 and 59 by an extensive display of mill dyed knitting yarns and knitted textiles. The goods shown consisted of stockings of cotton, wool, silk, artificial silk and commercial mixtures of these fibers, of underwear, bathing suits, glove fabrics and other knitted materials—each illustrating the latest developments in knit goods dyeing. The current issue of "Dyestuffs," the company magazine, was distributed at the National booth. The exhibit was in charge of Dr. L. J. Matos, who was assisted by technical and commercial representatives drawn from the several National branch offices.

The Franklin Process Company, Providence, R. I., yarn dyers, spinners and manufacturers of glaze yarn and dyeing machines, booth No. 308, was headquarters for Franklin Process Company salesmen and guests. A cordial welcome was extended not only to customers and friends but especially to those who were desirous of effecting economy in yarn purchases and yarn processing.

The International Nickel Company, New York, in booths Nos. 70 and 71, displayed Monel-metal and nickel products in commercial forms, such as are used in the construction of hosiery and knit goods dyeing machinery; a special display of castings for use in textile machinery, and attract-o-scopes displayed slides of installations and equipment of the various manufacturers. E. A. Turner was in charge, assisted by Messrs. Calnan, Worthington, Smith and Bennett.

Fletcher Works, Inc., Philadelphia, in booths Nos. 224 and 225, exhibited a 48-inch vertical motor-driven extractor. This machine was equipped with safety cover to conform to all State laws. The company was represented by C. W. Schaum, W. H. Rometsch, Jr., Albert Cordingly and H. N. Rahn.

The Permutit Company, 440 Fourth Avenue, New York, N. Y., occupied booths Nos. 360 and 361, where a model of water softening and filtering equipment such as is used in filtering plants was exhibited. Even the small pipes and strainers in the interior of the water-softening tank were reproduced in miniature, effecting an excellent educational exhibit of the Permutit system. The Permutit Company manufactures both rapid and slow regenerating zeolite water softeners, as well as all other types of equipment for treating water to render it pure, soft and correct for industrial purposes; also the Ranarex combustion indicator, which was in operation at this exhibit. This instrument indicates the percentage of CO_2 in flue gas by a purely mechanical means which completely avoids the sensitive and delicate parts which break so easily in ordinary CO_2 recorders. Messrs. Smith, Epple, McConnell, Shedden, Corin, Hess and Lowrie were in attendance.

Five dyeing machines and two extractors comprised the dyehouse equipment on display at the large exhibit of the American Laundry Machinery Company, Cincinnati, at spaces 72 to 76, inclusive, and 108 to 111, inclusive. Four large dyeing machines included two solid head Monel-metal machines, sizes 42 x 84 inches and 36 x 64 inches; a 36 x 36-inch Acme style Monel-metal-lined silk-finish machine, and a 36 x 64-inch Acme open pocket-type regular finish dyeing and fulling machine. One small U-shaped dyeing machine was a 32 x 30-inch Monel-metal-lined silk-finish model, the smallest made by this manufacturer.

The large extractor was a 48-inch Humatic, the small one a 30-inch special deep vertical motor-driven model. These extractors are equipped with the newest automatic devices, which render their operation extremely simple and efficient, requiring but little attention on the part of the operator.

The representatives of the American Laundry Machinery Company demonstrating this dyeing and extracting equipment were Paul J. Abrams, G. R. Schermerhorn, H. C. Rembold, W. C. Dodson, Frederick Goosemann, R. A. Whitney and G. G. Rups.

The Kali Manufacturing Company, in booths Nos. 163 and 164, had on display a number of chemical specialties for textile processing. One product to which special attention was drawn was Hydroxy Three-Fiber Boil-Off Oil for boiling off and dyeing in one bath. Other Kali products which were of interest to the knitting trade were Kalizine, for finishing chiffon hosiery; Developene, for intensifying and softening goods dyed with sulphur blacks; Hydroxy M Oil, a highly sulphonated oil used in the dye bath when wetting out or before dyeing or mercerizing; Hydroxy art silk coning oil, for natural rayon or dyed and bleached rayon; Solivol B, for pure silk throwing and backwinding; Kali Katalizer, for making dye penetrate heels and toes and assuring level shades. A number of other chemical specialties for the textile trade in general were on display at this exhibit, and their use in processing was lucidly explained by S. G. Davenport, secretary of the company; J. J. Donlen, or H. L. Nisser. James A. Branegan, president of the company, was also at the Kali booth during the show.

The exhibit of the Tolhurst Machine Works, Troy, N. Y., was featured by machinery in operation. This manufacturer displayed 48-inch direct motor-driven extractor, with guards so arranged that power cannot be applied while guard is open, guard cannot be opened while basket is in motion, and equipped with timer to automatically stop machine and signal operator at end of any predetermined run by bell and light. A 26-inch motor-driven solid curb extractor, with guards arranged same as the 48-inch, was also shown. Representatives at the booth were: R. K. Cheney, sales manager; J. W. Bird and J. McKeon. W. C. Dutton, vice-president, was in charge.

DYERS' AND CLEANERS' ASSOCIATION TO HAVE RESEARCH INSTITUTE

Plans have been approved and construction begun in Washington on a modern research laboratory to be known as the National Association Institute of Cleaning and Dyeing. This building, which will be completed before the end of the present year and which will be built and maintained by the National Association of Dyers and Cleaners, will include research laboratories of the most modern type as well as a small scale dyeing and cleaning establishment wherein problems solved in the laboratory may be put to practical test. The cost of the building when completed will be in the neighborhood of two hundred and fifty thousand dollars.

The Institute will be operated in close association with the Bureau of Standards. C. C. Hubbard, who has for the past three years been maintained by the Association as Research Associate at the Bureau of Standards, will head the staff of the new Institute, while some new incumbent yet to be appointed will take his place as Research Associate at the Bureau of Standards. Mr. Hubbard will be assisted at the Institute by M. H. Goldman and Mrs. M. F. Faling, both of whom are being transferred from the staff of the Bureau of Standards to serve as instructors and to superintend research at the new Institute. Messrs. Hubbard and Goldman are both members of the American Association of Textile Chemists and Colorists and the American Chemical Society.

Plans for work to be covered at the Institute include not only the solving of problems for members of the Association and the practical testing of these problems when solved, but there will be regularly conducted in addition a post-graduate course of technical instruction for men who have already had practical experience in the dyeing and cleaning industry. It is felt by those in charge of the work that it is wiser to take men who have already had practical experience and teach them the theory of their operations than it is to endeavor to instruct those who have not had previous practical experience.

A dye plant has been added to the Cherry Cotton Mills, one of the leading industries of the Muscle Shoals district, in order that a higher grade of yarn can be produced. The company will continue to produce the natural color yarns, but in addition will introduce colored and higher priced material.

THE DYEING OF BAST AND FIBER STRAW

(*Continued from page* 230)

been found to give good results when applied to the bleaching of straw fiber. Thus, for example, good results can be obtained by bleaching the straw stock with sulphurous acid in the sulphur chambers, with mixtures of hydrogen peroxide and sodium peroxide, and with sodium perborate.

Bleaching

When the bleaching of straw is carried out in the sulphur chambers, the material is subjected to the action of sulphur dioxide gas while the fibers are in the moist condition. Before the straw is allowed to come into the sulphur chambers it is given a good wetting down with the aid of a lukewarm solution of soap and then, without being subjected to any washing, the straw is centifuged. The straw is allowed to remain in the sulphur chambers for a period of twelve hours, and it is best to allow the straw to remain in the apparatus in contact with the sulphur fumes overnight. Then the straw is taken out, washed thoroughly and given an acid treatment, whereat it is washed again with pure water. The straw is finally dried in a space where the ventilation is good.

The chemicals usually found on the market are employed in bleaching with hydrogen peroxide, and the bleach used for this purpose contains either 3 or 15 per cent of hydrogen peroxide by volume. The first grade of peroxide is diluted with from 3 to 5 times the volume of water and the second grade with 15 to 25 times the volume of water. In each case pure water entirely free of iron is employed. Then the solution is warmed up to a temperature of approximately 40 deg. Cent., and is made very weakly alkaline by the addition of a small amount of a solution of ammonium chloride. The alkalinity is such that red litmus paper is just barely turned blue.

The straw stock, which has been properly wetted down and which is to be bleached, is introduced into this solution, and allowed to remain until the desired whiteness is obtained. In order to prevent the oxygen gas, which is developed during the bleaching operation from lifting the straw stock out of the bleach liquor, the materials are covered with a latticework cover made of wood. The bleaching tank may be made from wood or earthenware, and metals must be avoided for they have a potent action on the hydrogen peroxide and decompose it quickly. The heating coil that is employed to raise the temperature of the bleaching solution is best made from lead and should be allowed to remain in the bleach tank only for such a length of time as is required to effect the necessary temperature rise. As long as the bleach liquors remain clean, they can be used over and over again until their bleaching potency has been entirely destroyed.

In order to increase the effect of the peroxide bleach it is recommended that the straw be given an aftertreatment with the hydrosulphite blankite. Thus, after the straw stock has been washed it is introduced into a bath which contains 1 kilogram of blankite per 100 kilograms of water.

When sodium peroxide is used in the bleaching process the bleach liquor may be prepared in the following manner: One hundred liters of water are acidified with 2.5 kilograms of sulphuric acid, and then peroxide of sodium is strewn over the surface of the liquor. It is essential that this be done carefully so as to avoid loss of oxygen as far as possible. Hence, the peroxide of soda is added from a distributing box. Sufficient of the peroxide is added to leave the solution slightly acid. About 2 to 2½ kilograms of the peroxide are generally required for this purpose. Then the bleach liquor is heated up to a temperature of 35 to 40 deg. Cent., and it is thereafter made weakly alkaline with the aid of a solution of water glass or of sal ammoniac. The bleaching process is then carried out in the same manner as has been previously described.

In bleaching wood bast fibers, in addition to the use of peroxide of soda bleach liquor it is also possible to employ chloride of lime.

The Dyes Employed

The following classes of coloring matters can be employed to good advantage in the dyeing of straw and bast fibers. The basic and the so-called alum coloring matters are very well suited for dyeing straw, while acid and substantive dyestuffs are used to a very large extent in the dyeing of bast fibers.

As in all dyeing processes, the properties of the water employed in making the dye liquor plays an important role in the dyeing of straw and bast fibers. The first condition that must be faithfully fulfilled in order to be able to secure good dyeing results is to employ a water that is as soft as possible. When this cannot be done and it is necessary to use hard water, it is absolutely essential, and this applies particularly to cases where basic coloring matters are employed, that the hardness of the water be removed in some suitable manner. Otherwise it will be impossible to avoid precipitation of the insoluble lime salt of the coloring matter in question. When this happens the straw will be spotted.

The dyeing with basic coloring matters is carried out in the following manner: In the first place the straw or other material is well wetted down. Then it is entered into the liquor which is made with the addition of from 3 to 5 per cent of acetic acid or with 2 per cent of alum and 2 per cent of acetic acid. The straw is first treated with this dye liquor for a period of 10 to 15 minutes in the cold or lukewarm condition. Then the straw is taken out of the acid bath, and the dissolved coloring matter is added. The straw is then added, the temperature of the bath gradually brought up to 70 degrees and the dyeing concluded by maintaining the straw in this dye liquor at that temperature for a period of three to four hours.

When dark shades are to be produced on the straw materials, it is customary to add an additional 1 to 2 per cent of acetic acid or from ½ to 1 per cent of formic acid. Just as soon as the color has been matched with sample, the straw is removed. It is then washed with clean water in the usual manner.

The acid coloring matters are used for the most part in the dyeing of such materials that do not absorb the dyestuff with ease. The dyeing is carried out in a dye liquor which is maintained at the boiling temperature, and which is used without the addition of chemicals or to which from 10 to 15 per cent of acetic acid is added. When soft water is used, a dyeing period of two to four hours is sufficient to give the desired results, while when harder waters are employed it is necessary to prolong the dyeing to from four to six hours. After dyeing, the straw and bast materials are given a thorough washing with water.

Another class of coloring matters that can be used with good results on these fibrous substances is the substantive dyestuffs. These are employed in a bath which does not contain any other added ingredients; it is possible also to obtain good results by the addition of sodium sulphate to the dye liquor. The dye liquor is first brought up to a temperature of approximately 50 deg. Cent., and the materials are introduced into the bath at that temperature. Then the liquor is brought up to the boiling point and maintained at that temperature for a period of one to two hours. When it is desired to obtain deeper shades it is customary to introduce the straw and bast materials into the dye liquor in the cold and maintain them there for several hours. The dye liquors are not exhausted when employed in this manner, and can be employed over again in the dyeing process. However, it is understood that it is necessary to add, each time, the required amount of dyestuff.

All the different members of the substantive series of coloring matters which possess the property of readily dyeing cotton materials are found to give equally good results when used for dyeing straw and particularly when employed for coloring bast wood fibers. If the last-named material has been strongly plaited or twisted, then it is recommended that an addition of from 1 to 1½ per cent of soda or borax be added to the color liquor. After the material has been dyed it is thoroughly washed.

The drying of the colored straw or the bast fibers should be carried out at temperatures as low as possible, and at best in a place which is well ventilated and shaded. The dyeing of finished straw hats may also be carried out in accordance with the aforementioned processes. However, the substantive coloring matters are best suited for this purpose, as when they are employed the cotton threads that are used to sew the straw together to form a hat are also dyed at the same time as the straw and in the same color bath. When the process is carried out with the aid of acid dyes, the dyeing of the cotton threads must be carried out in a fresh, cold dye liquor. After dyeing the hats are processed, sized, etc., in the regular manner.

A. C. S. PROPOSES DYE SYMPOSIUM

The Dye Division of the American Chemical Society has announced plans to hold a symposium on "The Accomplishments of the American Chemist in the Dye Field." Dr. M. L. Crossley, chief chemist of the Calco Chemical Company, will act as chairman of the symposium at the meeting of the division in Philadelphia.

The News Edition of Industrial and Engineering Chemistry, in making the announcement, states:

"So much has been accomplished within the last decade in America that on the occasion of the semi-centennial celebration of the Society it seems well to stop and take stock of these accomplishments that there may be a better appreciation of what has been done. It is none too early to begin careful plans for this important symposium, and if the companies manufacturing dyestuffs in America will co-operate fully with the Dye Division of the Society an important program can be presented. Much of real scientific and popular interest can be offered by these companies without in any way encroaching upon confidential information, and we urge their whole-hearted co-operation in this undertaking."

RUTHERFORD & CO. SETTLED IN NEW QUARTERS

J. G. Rutherford & Co., dyestuff manufacturers and dealers, are now permanently located in their new quarters, occupying an entire three-story building at 625-627 Hudson Street, New York City. The building is ideally laid out for conducting a dyestuff and chemical business, with the mixing, storing and shipping departments on the street level, the offices on the second floor and a well-equipped, well-lighted laboratory on the third floor. Thus close co-operation between the order and sales departments and the shipping department and between the laboratory and the offices is greatly facilitated by this arrangement, an advantageous feature which the firm had in view when it took over the building, and which will become of increasing importance as the business expands.

TEXTILE EXPOSITION ALL SET

From all available reports it is evident that the gathering of textile interests in Boston this year will undoubtedly be one of the largest that has ever been attracted by the International Textile Exposition. The amount of interest created by the Exposition this year is surprisingly great, and General Manager Chester I. Campbell fully expects that every square inch of floor space in the Mechanics Building will be occupied during the week of April 12. Exhibition and Grand Halls on the main floor will be taken up by general textile firms while the basement will hold the power show, which is a branch of the exposition conducted by the New England Association of Commercial Engineers.

The Reduction Products of Azo Dyes

Part X

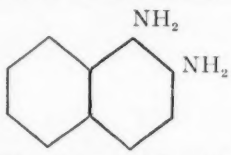
By WALTER C. HOLMES

Color Laboratory, Bureau of Chemistry

[EDITOR'S NOTE.—*The most practical and effective method for the identification of azo dyes consists in the isolation and identification of the products which they yield on reduction. This method finds less application than it might or should, partly because some of these products have never been isolated and investigated, and partly because much of the data which has been obtained in regard to such reduction products is greatly scattered and very difficult to locate.*

Mr. Holmes has made a search for all the available information on such reduction products, and this series contains a digest of his results with a systematic listing of the reduction products of the azo dyes published in the Colour Index, together with the available data on such properties and reactions as would be of service in their identification.]

No. 111.—1, 2-NAPTHALENEDIAMINE



$C_{10}H_{10}N_2$; Mol. Wt. 158.15; (C, 75.9%; H, 6.4%; N, 17.7%.)

Derived from C. I. Nos. 22, 61, 102, 335, 359, 469 and 529.

Silver rhombic leaflets (H_2O), mpt. 95-6°. Readily sol. in alc., ether and $CHCl_3$. Readily oxidized.

The *hydrochloride*, prisms, readily sol. in H_2O but only sl. sol. in HCl.

Diacetyl deriv., needles (alc.), mpt. 234°.

Benzoyl deriv., cryst. pdr. (Ac HO), mpt. above 280°.

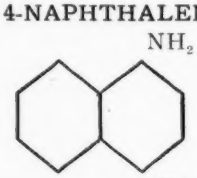
Dibenzoyl deriv., leaflets, mpt. 291°, diffic. sol. in alc. and Ac HO.

Fused with 2-oxydiphenylacetic acid lactone the diamine gives 2-(2'-oxybenzhydryl-)naphthimidazole, colorless microscopic prisms, mpt. 294-5°, sol. in cold H_2SO_4 with a brown-green color.

With phenanthrenequinone it gives naphthophenanthrazine, yellow dissolve in H_2SO_4 with a dark-violet color (yellow on dilution).

The additive comp. with *sym. trinitrobenzene* cryst. from alc. or C_6H_6 in deep purple needles, mpt. 203-4° (cor.).

No. 112.—1, 4-NAPHTHALENEDIAMINE



$C_{10}H_{10}N_2$; Mol. Wt. 158.15; (C, 75.9%; H, 6.4%; N, 17.7%).

Derived from C. I. Nos. 267 to 270, 289, 290, 293 to 296, 298, 299, 301, 304, 307, 309 to 312, 315 to 319, 338, 358, 363, 397, 468, 528, 531, 535 to 537, 552 to 554, 557, 558, 566 to 568, 576, 578 and 579.

Very unstable, particularly in the moist state. Mpt. 120°. With nitrous acid or chromic acid (heat) it gives α-naphthoquinone. With alkaline hypochlorite it gives an insol. quinone dichloroimide. Gives a fluorescent green ether sol. when alk. sols. are shaken with ether.

The sulfate is sparingly sol.

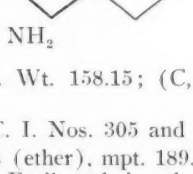
Acetyl deriv., the hydrochloride cryst. in long needles, the bichromate in orange yellow needles and the picrate in yellow needles, difficultly sol. in H_2O.

Diacetyl deriv., cryst. (Ac HO), mpt. 303-4°, nearly insol. in H_2O or ether, diffic. sol. in alc., readily sol. in hot Ac HO.

Benzoyl deriv., needles, mpt. 186°, diffic. sol. in hot H_2O, readily sol. in alc.

It gives an addition production with *sym. trinitrobenzene*, mpt. 218° (decomp.), black needles (C_6H_6).

No. 113.—1, 5-NAPHTHALENEDIAMINE



$C_{10}H_{10}N_2$; Mol. Wt. 158.15; (C, 75.9%; H, 6.4%; N, 17.7%).

Derived from C. I. Nos. 305 and 526.

Colorless prisms (ether), mpt. 189.5°. Sublimes almost without decomp. Easily sol. in ether and $CHCl_3$, mod. sol. in hot H_2O, almost insol. in cold H_2O. Suspended in H_2O the free base gives a blue-violet color with $FeCl_3$ and after some time a blue-violet pptte. The dil. alc. sol. is colored blue, turning violet blue, with a drop of isoamylnitrite and a little acid. Does not give naphthoquinone on warming with chromic acid.

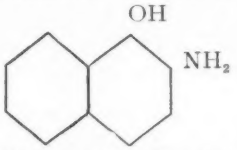
Sulfate, fine needles, nearly insol. in dil. H_2SO_4, alc. and ether.

The *acetyl deriv.*, greenish white granules, does not melt under 360°. It apparently causes marked itching.

Additive comp. with: *m-dinitrobenzene*, brown black cryst. (alc.), mpt. 78-9°; *sym. trinitrobenzene*, deep brown needles (alc.), mpt. 245° (cor.); *1, 3, 5-trinitronaphthalene*, black needles (alc. and C_6H_6), mpt. 243° (decomp.).

If the base is diazotized and boiled with cuprous chloride in HCl it gives 1, 5-dichlornaphthalene, mpt. 106-7°.

No. 114.—2-AMINO-α-NAPHTHOL

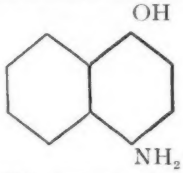


$C_{10}H_9NO$; Mol. Wt. 159.13; (C, 75.4%; H, 5.7%; N, 8.8%; O, 10.1%).

Derived from C. I. Nos. 3 (201) and 203.

Difficultly sol. in cold H_2O. Cryst. in needles from H_2O containing SO_2. Shaken with air its ammoniacal sol. is colored green and a violet skin of iminooxynaphthalene with a glittering metallic lustre separates on the surface. With oxidizing agents 2-amino-α-naphthol gives dinaphthyl-β-diquinone but no naphthoquinone.

No. 115.—4-AMINO-α-NAPHTHOL



$C_{10}H_9NO$; Mol. Wt. 159-13; (C, 75.4%; H, 5.7%; N, 8.8%; O, 10.1%).

Derived from C. I. Nos. 81, 150, 175, 192 (and 201).

The *hydrochloride*, needles, is readily sol. in H_2O and gives a cryst. double salt with $SnCl_2$. With HNO_2, or by heating with $FeCl_3$ or with oxidizing agents in general it gives α-naphthoquinone. With $CaCl_2$ and dil. HCl at 0° it gives 1, 4-naphthoquinone chloramide.

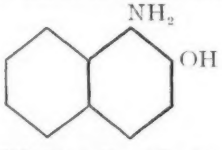
The *picrate* precipitates as a yellow crystalline powder.

The *N-acetyl* deriv. cryst. in needles (alc.) mpt. 187°. It gives a nitrosamine which melts at 203° and dissolves in alkalies with a gold-yellow color. Boiled with chloracetic acid and NaOH it gives 4-acetamino-1-naphthoxyacetic acid, colorless aggregates of spears which soften at about 225° and melt at 233-4°.

The *diacetyl deriv.* ($C_2H_3O.NH.C_{10}H_6.O.C_2H_3O$), prismatic cryst. ($H_2O$), mpt. 158°, may be sublimed.

Heated with aniline (180°) the base gives 1-anilino-4-hydroxynaphthalene, colorless cryst., mpt. 92°. Corresponding deriv. with ρ-chloraniline, mpt. 96°; with 2, 4-dichloraniline, colorless needles, mpt. 73°; with anthranilic acid, mpt. 247-9°.

No. 116.—1-AMINO-β-NAPHTHOL



$C_{10}H_9NO$; Mol. Wt. 159.13; (C, 75.4%; H, 5.7%; N, 8.8%; O, 10.1%).

Derived from C. I. Nos. 2, 24, 44, 68, 69, 73, 82, 83, 93, 94, 97, 113, 116 to 118, 121, 123, 135, 151, 159, 161, 164, 165, 169, 172, 173, 176, 177, 189, 193, 196, 202, 204, 206, 214, 224, 249, 258, 265, 266, 272, 275, 280, 283, 287, 292, 306, 314, 336, 337, 363, 381, 387, 399 (432, 433), 487, 501, 512, 530, 564 and 571.

The free amidophenol cryst. in glittering leaflets which are very diffic. sol. in hot H_2O. Cryst. in quadratic plates from ether (fluorescent sol.). It gives a yellow sol. in ammonia which turns dark brown on shaking with air.

The *hydrochloride* fine white needles, is easily sol. in H_2O. The addition of sod. acetate to the sol. precipitates the base; the addition of alkalies results in no precipitation but the sol. turns brown. Sol. in 15 parts boiling alc. and only slightly sol. in dil. HCl.

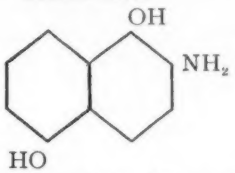
The *acetyl deriv.*, leaflets (alc.), mpt. 235° (turning brown).

Diacetyl deriv., mpt. 264°.

With oxidizing agents aqueous sols. of the salts give β-naphthoquinone.

The *carbonyl deriv.*, small dense prisms, mpt. 206°; the *acetylcarbonyl* deriv., reddish needles, mpt. 121°; the *benzoylcarbonyl* deriv., white needles (alc.), mpt. 256°.

No. 117.—2-AMINO-1, 5-DIHYDROXYNAPHTHALENE



$C_{10}H_9NO_1$; Mol. Wt. 175.13; (C, 68.5%; H, 5.2%; N, 8.0%; O, 18.3%).

Derived from C. I. No. 170.

The free base is unstable, particularly in the moist condition, and becomes colored quickly in the light and partially resinous.

The hydrochloride is readily sol. in H_2O but is difficultly sol. in 20% HCl, from which it cryst. in gray-white needles or prisms. It gives a $ZnCl_2$ double salt, solorless needles, diffic. sol. Treated with $FeCl_3$ a sol. of the hydrochloride gives a red-violet color, turning brown; and, with further $FeCl_3$, a deep red brown sol. from which red needles are deposited at once.

No. 118.—1-AMINO-2, 7-DIHYDROXYNAPHTHALENE

$C_{10}H_9NO_2$; Mol. Wt. 175.13; (C, 68.5%; H, 5.2%; N, 8.0%; O, 18.3%).

Derived from C. I. Nos. 4, 187 and 414.

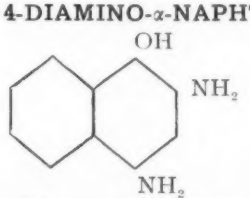
The free base is unstable, oxidizing in the air quickly. The oxidation product is 1, 2, 7-oxynaphthoquinone, small brown needles, mpt. 194°.

The *hydrochloride*, needles or leaflets, is more stable.

Triacetyl deriv., mpt. 183°; *tetracetyl deriv.*, mpt. 135°.

Heated with aniline and iodine it gives 2, 7-diphenylamino-α-naphthylamine, mpt. 164°.

No. 119.—2, 4-DIAMINO-α-NAPHTHOL



$C_{10}H_{10}N_2O$; Mol. Wt. 174.15; (C, 68.9%; H, 5.8%; N, 16.1%; O, 9.2%).

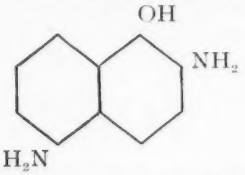
Derived from C. I. Nos. 9, 239 and 240.

Hydrochloride, microscopic leaflets. The dry salt is moderately stable but the moist salt oxidizes rapidly in air giving diiminonaphthol. With $SnCl_2$ it forms a double salt, monoclinic prisms, insol. in conc. HCl, readily sol. in alc.

Triacetyl deriv., microscopic needles (Ac HO), mpt. 280° (decomp.), diffic. sol. in hot alc.

With nitrous acid or alkyl nitrites the diaminophenol is oxidized to 2-amino-1, 4-naphthaquinoneimide.

No. 120.—2, 5-DIAMINO-α-NAPHTHOL

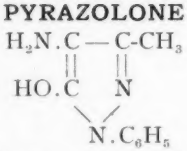


$C_{10}H_{10}N_2O$; Mol. Wt. 174.15; (C, 68.9%; H, 5.8%; N, 16.0%; O, 9.2%).

Derived from C. I. No. 210.

Apparently no data are available on this compound.

No. 121.—1-PHENYL-3-METHYL-4-AMINO-5-PYRAZOLONE



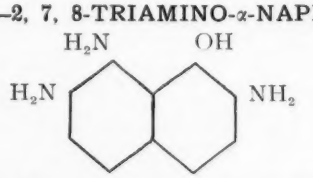
$C_{10}H_{11}N_3O$; Mol. Wt. 189.16; (C, 63.5%; H, 5.9%; N, 22.2%; O, 8.5%).

Derived from C. I. Nos. 638, 641, 649, 651 and 652.

The hydrochloride, needles, is diffic. sol. in dil. HCl.

The base is unstable and oxidizes in air quickly to rubazonic acid, red needles (Ac HO), insol. in H_2O, and dil., acids, sol. in alkalies with a deep violet color, diffic. sol. in alc. and Ac HO and readily sol. in benzene, ether and $CHCl_3$.

No. 122.—2, 7, 8-TRIAMINO-α-NAPHTHOL

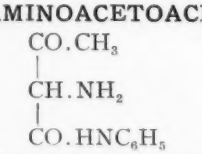


$C_{10}H_{11}N_3O$; Mol. Wt. 189.16; (C, 63.5%; H, 5.9%; N, 22.2%; O, 8.5%).

Derived from C. I. No. 241 (and 242 on the fiber).

Apparently no data are available on this compound.

No. 123.—AMINOACETOACETANILIDE



$C_{10}H_{12}N_2O_2$; Mol. Wt. 192.16; (C, 62.5%; H, 6.3%; N, 14.6%; O, 16.7%).

Derived from C. I. No. 648.

Apparently no data are available on this compound.

NEWPORT BRINGS OUT TWO NEW BROWNS

Two leaflets issued by the Newport Chemical Works, Inc., describe the properties of two new additions to the Newport line of Direct Browns—Newport Direct Brown XR and RXN.

Newport Direct Brown XR is said to be distinguished by its slow exhausting and level dyeing qualities and good fastness to light. It is described as suitable for use in dyeing cotton in all stages of manufacture, either as a self-shade or in combination for the production of various brown shades. It is claimed, further, to be excellent for rayon, to discharge to a pure white and to improve in fastness to light and washing on after-treatment with copper sulphate.

The RXN type, it is stated, is a valuable brown for dyeing cotton, rayon and silk, natural or weighted. It is described as of excellent solubility, very level dyeing and useful for shading purposes, and as discharging white and possessing excellent fastness to steaming and better light fastness than the average type of direct browns.

PONTAMINE LIGHT GRAY 2G

E. I. du Pont de Nemours & Co. announce the addition of Pontamine Light Gray 2G to their range of Pontamine colors. It is described as a direct color yielding brilliant bluish shades of gray on cotton. It is said to possess good general fastness, comparing favorably with other direct grays, and to be exceptionally fast to light for a direct color. Its fastness to acids and alkalies and perspiration is claimed as very good, and its resistance to water, washing and stoving as equal to that of the average color of its class. It is recommended for cotton goods of all varieties, draperies, upholstery, etc., as well as voiles, crepes and linings. As it is said to exhaust very well and to be quite level dyeing, it is suitable for all types of machines, and particularly for the padder, on which exceedingly even shades are obtained.

When dyed in a neutral bath, according to the announcement, Pontamine Light Gray 2G leaves silk practically unstained, so that it is particularly useful as a shading color in dyeing unions, half-silk hosiery, etc. The color is further recommended for discharge work, as a clear white is obtained with Sulphoxite C.

NEW METHOD OF RECLAIMING SILK WASTE

The Sun Silk Reclaiming Company, of 1931 Hope Street, Philadelphia, Pa., has obtained patents upon a new process for reclaiming hosiery waste which it is claimed will rewind the waste with a loss of less than one per cent, whereas ordinary methods have a wastage of about twenty-five per cent.

Moreover, according to the claims of the company the new method yields a smooth yarn which produces an excellent stocking when reknitted, while other methods currently employed yield an extremely kinky yarn which is most difficult to reknit, with the result that hose reknitted therefrom can only be sold as seconds.

Technical Notes from Foreign Sources

Reducing Power of Sodium Hyposulphite and Use for Bleaching Silk

Sodium sulphite when used in aqueous alocholic solution possesses reducing powers which may be employed for the purpose of bleaching silks. For this purpose the air-dry natural silk is thoroughly bleached by immersion for a period of three-quarters of an hour in a mixture which contains 100 grams of sodium hyposulphite, 2 liters of denatured alcohol and 600 c.c. of water. Further quantities of silk may be bleached afterwards in the remaining liquor after successive additions of suitable quantities of water, about 300 c.c., until the sodium hyposulphite has completely dissolved. When cotton which is dyed with Indigo is treated with this solution, it is simultaneously decolorized so that its color is not restored by oxidation with the aid of a dichromate.

A yellow acidic substance which has an agreeable odor and which is soluble in water is obtained by evaporation of the spent bleaching liquor, and it is reprecipitated from its aqueous solution by the addition of ammonia or hydrochloric acid. Copper is stained black rapidly by immersion in an aqueous solution of sodium hyposulphite, but only slowly in a similar solution which contains alcohol. (Rev. gen. Mat. Color., 1925, Vol. 29, page 288.)

Obtaining Uniform Dyeings

Uniform dyeings of great fastness to rubbing are obtained by adding to the dye bath, or by previously wetting the fiber with, propylated or butylated aromatic sulphonic acid or their salts or such derivatives of other cyclic hydrocarbons, with or without the presence of aliphatic, especially the higher aliphatic alcohols.

In examples a dye bath for wool piece goods comprises Cyananthranol, Azoflavine, Sorbine Red, or other acid wool color, Glauber salt, sodium isopropylnaphthalene sulphonate and sulphuric acid; or crude impure wool may be previously wetted with the sulphonate and a smaller quantity thereof used in the dye bath. A dye bath for raw unboiled cotton yarn comprises Indanthrene Blue GCD, sodium hydroxide, sodium hydrosulphite and sodium butyl naphthalene sulphonate. A second dye bath for cotton yarn comprises Oxamine Blue A, sodium sulphate and sodium isopropylnaphthalene sulphonic acid. The above sulphonic acids may also be employed for developing coloring matters directly on the fiber. (British Patent No. 242,233.)

Soluble Starch

A study has been made of the use of various reagents for the purpose of solubilizing starch, and it has been found that some of these work very energetically, while others have a decided irregular action on the starch molecule. Furthermore, it was established, in addition, that when the boiling of the starch is carried out for a prolonged period of time a partial liquefaction of the starch is produced and in this manner a product is obtained which can be used with good results for a variety of applications. But the long duration of the process and the care that must be taken in carrying it out make it one that is not convenient to use.

Of the many chemicals and allied substances that are used in the preparation of solubilized starch, the one that is used with the greatest advantage is hydrogen peroxide. For example, 50 kg. of starch, which has first been admixed with the required amount of water, is then mixed with 600 c.c. of hydrogen peroxide and the mixture is then boiled for twenty minutes. The product that is obtained in this manner is ready for immediate use. But it follows that the starch must be neutral and the excess of acid that is present in it must be neutralized with the necessary amount of sodium acetate.

The following mixture may also be used, of which hydrogen peroxide is not an ingredient but is formed by the reaction between sodium peroxide and sulphuric acid. Forty grams of sodium peroxide are gradually added to a sufficient quantity of cold water which contains 80 grams of sulphuric acid, 50 deg. Be. concentration, and 10 grams of alcohol. The purpose of the alcohol is to stabilize the solution. After the boiling operation the solution must, of course, be neutralized.

In a test which was made with a soluble starch that had been obtained by treatment of starch with the aid of hydrogen peroxide and with another soluble starch that had been obtained with the aid of malt, the following results were secured: One hundred parts of the soluble starch which had been made with the aid of hydrogen peroxide gave the same effect as 150 parts of the starch prepared with the aid of malt. Then, in the calendering process the former starch was much more resistant to the effects of the heat and pressure than the latter, the sizing action being better retained in spite of the fact that there was a lesser amount of starch in the goods.

The homogeneity of the oxidized starch, so-called for short, makes its use advisable for thickening solutions of dyestuffs and pastes in the direct printing process. The finish obtained in this manner is insoluble in cold water after the fabric has been dried, and even when the goods have been steamed they still

have a good handle. The oxidized starch is very fluid and easily penetrates into the textile fibers. Due to the fact that only a small amount of steam has to be used in its manufacture and the short duration of the cooking process, its manufacture is highly economical. (Textile Mercury.)

White and Multicolor Effects with Sulphur Dyes

A very interesting article has been published in the Bulletin Societe Industrielle Mulhouse, 1925, pages 551-8, relating to the methods employed for obtaining white and multicolor effects on fabrics that have been dyed with sulphur colors

There were, in all, four reports on this subject. In the report it was indicated that resists under sulphur colors are obtained by means of printing pastes which contain manganese chloride and zinc oxide. White resist effects are produced by printing white mercerized cotton fabrics with a paste that contains 400 grams of manganese chloride, 500 grams of gum water and 100 grams of zinc oxide. The fabric is then dried and dyed in the usual manner for from five to thirty seconds at a temperature not in excess of 70 deg. Cent. with a pure dye liquor prepared with sulphur colors and sodium sulphide or sodium hydrosulphite. Black and white effects are obtained by printing a fabric with the aforementioned paste and a suitable aniline black printing paste, the fabric being passed through a Mather-Platt before dyeing.

Colored effects obtained by means of the ice colors are produced by printing the fabric, after it has first been prepared with the aid of beta-naphthol, with a paste preprepared by adding diazo compounds or preferably their double salts with zinc chloride or aluminum sulphate to the aforementioned reserve paste, then drying and developing the shade rapidly by passing the fabric for a period of three-quarters to one minute through a Mather-Platt, the fabric being subsequently dyed with sulphur dyes.

In the second report it is mentioned that color resist effects are obtained under sulphur dyestuffs and also under vat dyestuffs, such as Indanthrene Blue, Flavanthrene, Algol Blue, Algol Rose, Thioindigo Red and Thioindigo Scarlet, by the method which has been described above by means of mordant coloring matters (for example, Alizarine Blue and Alizarine Viridine) and basic coloring matters (for example, Prune Blue and Setocyanine) which are not immediately precipitated by zinc or manganese chloride. Precipitation of these coloring matters may also be prevented by the addition of suitable substances, for example, glacial acetic acid and phenol or resorcinol, which are fixed on the fabric by treatment for one to two minutes in a Mather-Platt.

Satisfactory printing pastes for blue and violet effects contain 30 grams of setocyanine, 50 grams of glacial acetic acid, 100 grams of phenol, 200 grams of reserve paste, containing 500 grams of zinc chloride and the same amount of gum water, 100 grams of a 50 per cent solution of tannic acid in acetic acid of 6 deg. Be. and 20 grams of Turkey Red oil.

In the third report it is mentioned that exceptionally bright red effects can be obtained with the use of Indanthrene Blue by means of the first resist paste which has been described above, whereas inferior results are obtained with the use of Indigo or blue sulphur coloring matters. A Para Red paste is used and the cotton fabric is printed with this paste, then dried, dyed at a temperature of 55 to 60 deg. Cent. for a period of 20 to 40 seconds in a dye liquor which contains Indanthrene Blue. Thereafter the fabric is washed, acidified, washed and soaped. It is also stated that these resist effects are quite satisfactory even if several weeks elapse betwen printing and dyeing.

In the fourth report colored resist effects under sulphur coloring matters are described as being obtained simultaneously with the aid of ice colors and basic dyestuffs by the method which is described in the first report. Sodium tungstate is added to the beta-naphthol that is used in the preparation of the fabric. Basic coloring matters are maintained in solution in the reserve printing paste which contains zinc chloride by the addition of a mixture of lactic and glacial acetic acids or phenol. After printing the fabric is dried, steamed twice in a Mather-Platt, dyed in a dye bath containing sulphur colors and sodium sulphide, then washed, acidified, washed and soaped.

New Azo Coloring Matters

Dyestuffs which give on cellulose acetate, in an acetic acid bath, yellow to blue and brown shades, of good fastness to washing and rubbing and excellent fastness to light, are obtained by coupling unsulphonated nitro-diazo-compounds of the benzene series (except those which have a hydroxyl group ortho to the diazo group) with monosulphonic acid capable of being coupled, derived from N-aryl, N-alkyaryl, N-aralkyl and N-alylaralykyl derivatives of aniline or its homologues or substitution products (other than the N-alylaralkyl derivatives of metanilic and meta-toluidine sulphonic acid.

For example, 2-4: dinitroaniline is diazotized with nitrosyl sulphate in concentrated sulphuric acid and then combined with sodium ethylbenzylaniline sulphonate. A bronze powder is obtained in this manner, which gives bluish-red shades. (British patent No. 220,303.)

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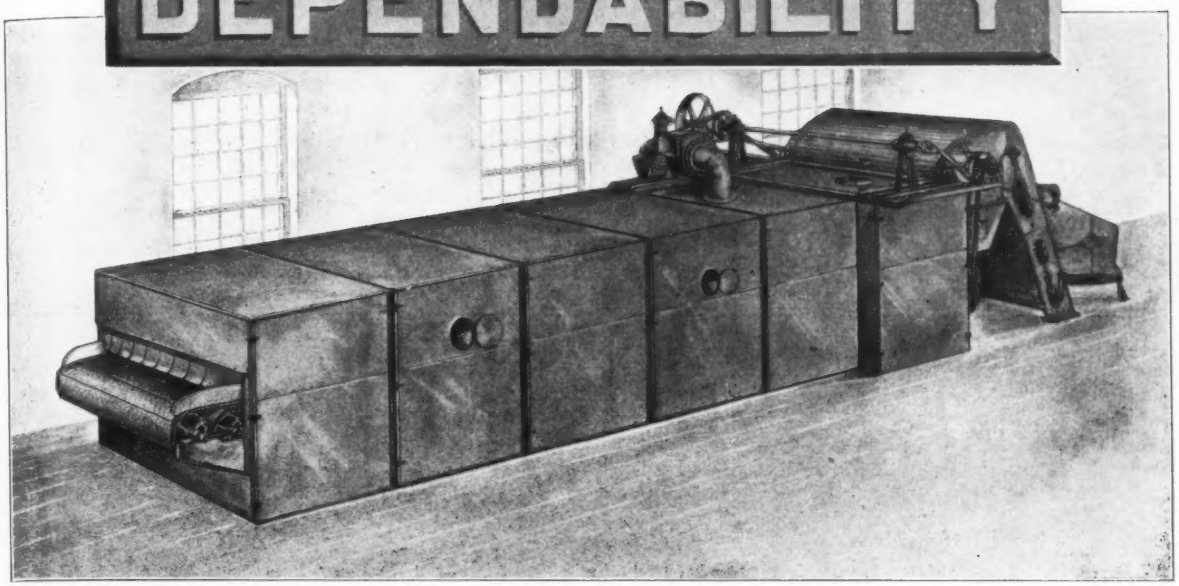

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Index to Advertisers Appearing in This Issue

American Aniline Products, Inc. III
American Rapidase Co. XI
Amid Duron Co. XV
Arabol Manufacturing Co. ..... —
Arkansas Co. XV
Arnold, Hoffman & Co. ..... —
Atlas Electric Devices Co. VIII

Bosson & Lane XIV
Brandwood, John, & Son VIII

Campbell, John, & Co. V
Carbic Color & Chemical Co. XIV
Ciba Co. ..... —
Corn Products Refining Co. ..... —
Cowles Detergent Co. ..... —

David, S. R., & Co. XIV
Dorr Co. ..... —
Dunker & Perkins Co. XVI
Du Pont de Nemours, E. I., & Co. VII
Dyer & Calico Printer ..... —

Fleischmann Co. ..... —
Foster, Edward C. ..... —
Franklin Process Co. ..... —

Geigy Co., Inc. ..... Front Cover
General Dyestuff Corp. IX

Hunter, James, Machine Co. XIII
Hussong Dyeing Machine Co. ..... —

Innis, Speiden & Co. XVI
International Textile Exposition ..... Third Cover
International Salt Co. ..... —

Jennings & Co. ..... —

Kali Manufacturing Co. XV
Klipstein, A., & Co. ..... Second Cover

Lewis, John D. ..... —

Malt-Diastase Co. VI

National Aniline & Chemical Co. XII
Neversink Dyeing Co. ..... —
Newport Chemical Works ..... Back Cover
New York Color & Chemical Co. V

Oakley Chemical Co. VI
Onyx Oil & Chemical Co. XV

Pennsylvania Dye & Bleach Works ..... —
Permutit Co. VIII

Roessler & Hasslacher X
Rohm & Haas Co. IV

Sandoz Chemical Works ..... —
Society of Dyers and Colourists ..... —
Solvay Process Co. VI
Suter, Alfred ..... —

Textile Finishing Machinery Co. ..... —
Tolhurst Machine Works ..... —

Union Color & Chemical Co. ..... —
United Chemical Products, Inc. IV
U. S. Color & Chemical Co. VIII

Vellner, Eugene XI

Wolf, Jacques, & Co. ..... —

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